
Capacity building Activities

DAY #4

**Apply methodological approaches to
Urban infrastructures**



GLOBAL
CENTER ON
ADAPTATION



Capacity Building Program Journey



DAY 1

Sensitization to
Climate Change &
Understanding
Climate Risk in
Homa Bay



DAY 2

Construct a
climate sensitive
diagnosis and
action
prioritization in a
data-scarce
context



DAY 3

Streamline climate
change in urban
development – a
step by step
approach



DAY 4

Apply
methodological
approaches to
urban
infrastructures

Objectives

Focus area

Climate Fresk
HB CRA

HB CRA
Urban drainage


Project cycle
NbS

**Climate resilient
checklist**



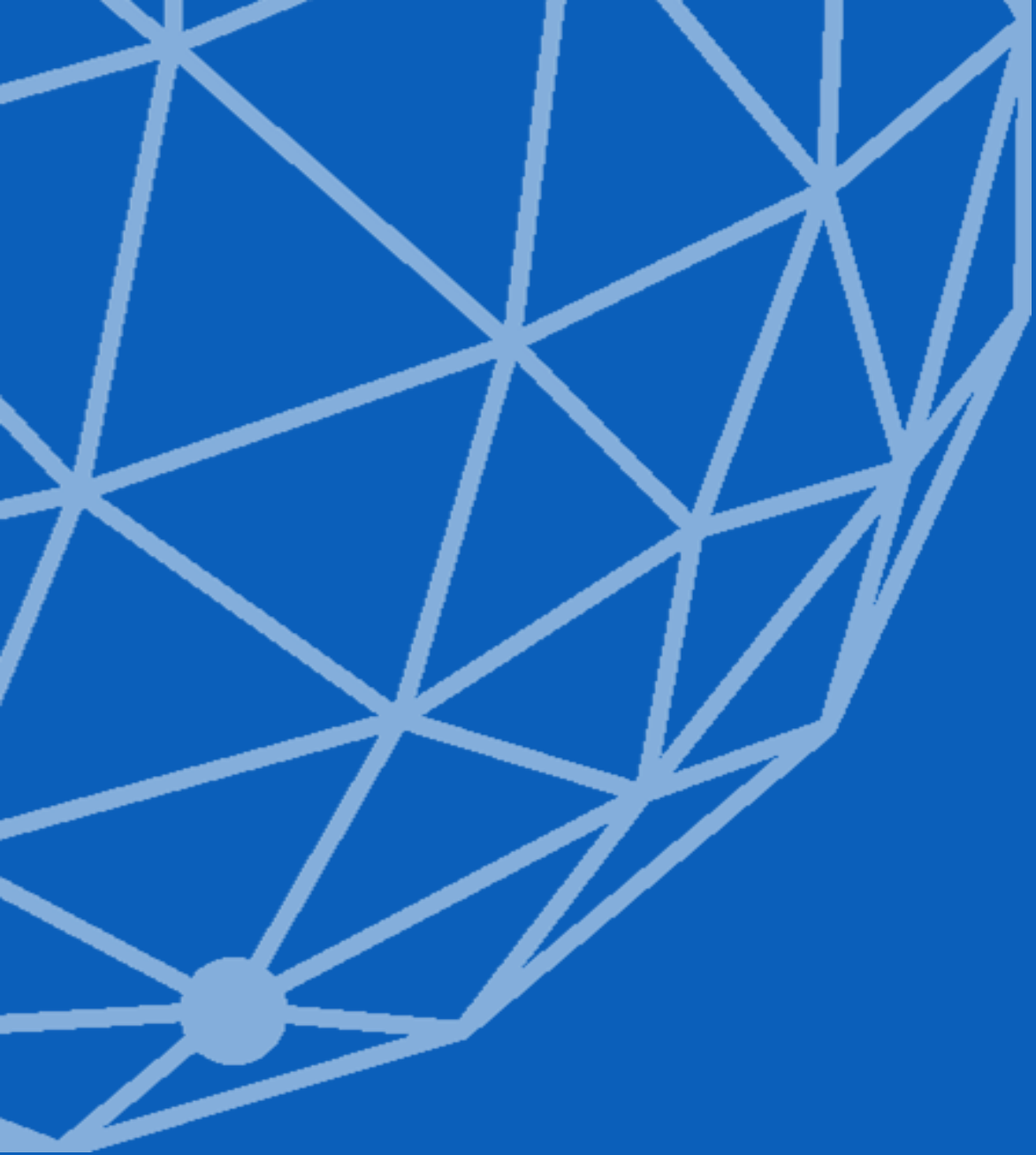
Agenda of Day #4

Agenda – Morning session

- 1 Session Introduction (9:00-09:15)
- 2 Field work preparation work (09:15-10:00)
- 3 Coffee Break  (10:00-10:15)
- 4 Field Visit (10:15-12:00)
- 5 Lunch (12:00-13:00)

Agenda – Afternoon session

- 1 Climate resilient checklist elaboration (13:00-14:00)
- 2 Feedback, self-assessment results (14:00-14:15)
- 3 Group picture & certificate (14:15-14:30)
- 4 Closing of the capacity building programme (14:30-14:45)
- 5 Coffee



Define a climate-resilient a
checklist

Task

You will be provided with an urban case study for this exercise. Before the field visit, you will think about a list of things to check to build a climate resilient project

1. You will go through 4 project phases:

Diagnosis & Planning

Project Design

Construction, Operation & Maintenance

Monitoring & Evaluation

2. At each phase, you will contribute to building a checklist based on your role's perspective

You will present the analysis and proposed criteria, including feasibility and co-benefits. Together, you will then build a shared, multi-actor checklist to guide urban projects in the Kenyan context.



Case Study: Upgrade of Sewage plant / C19 drainage

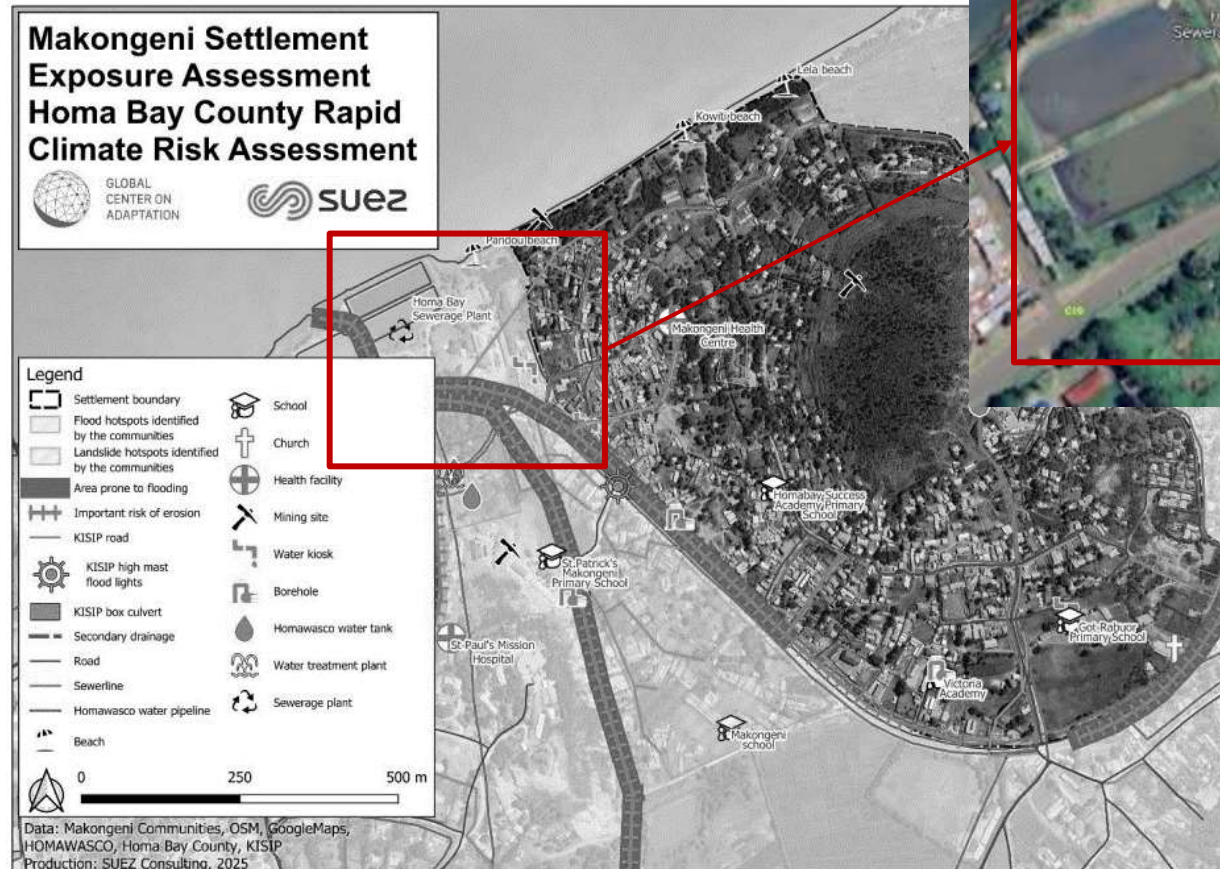
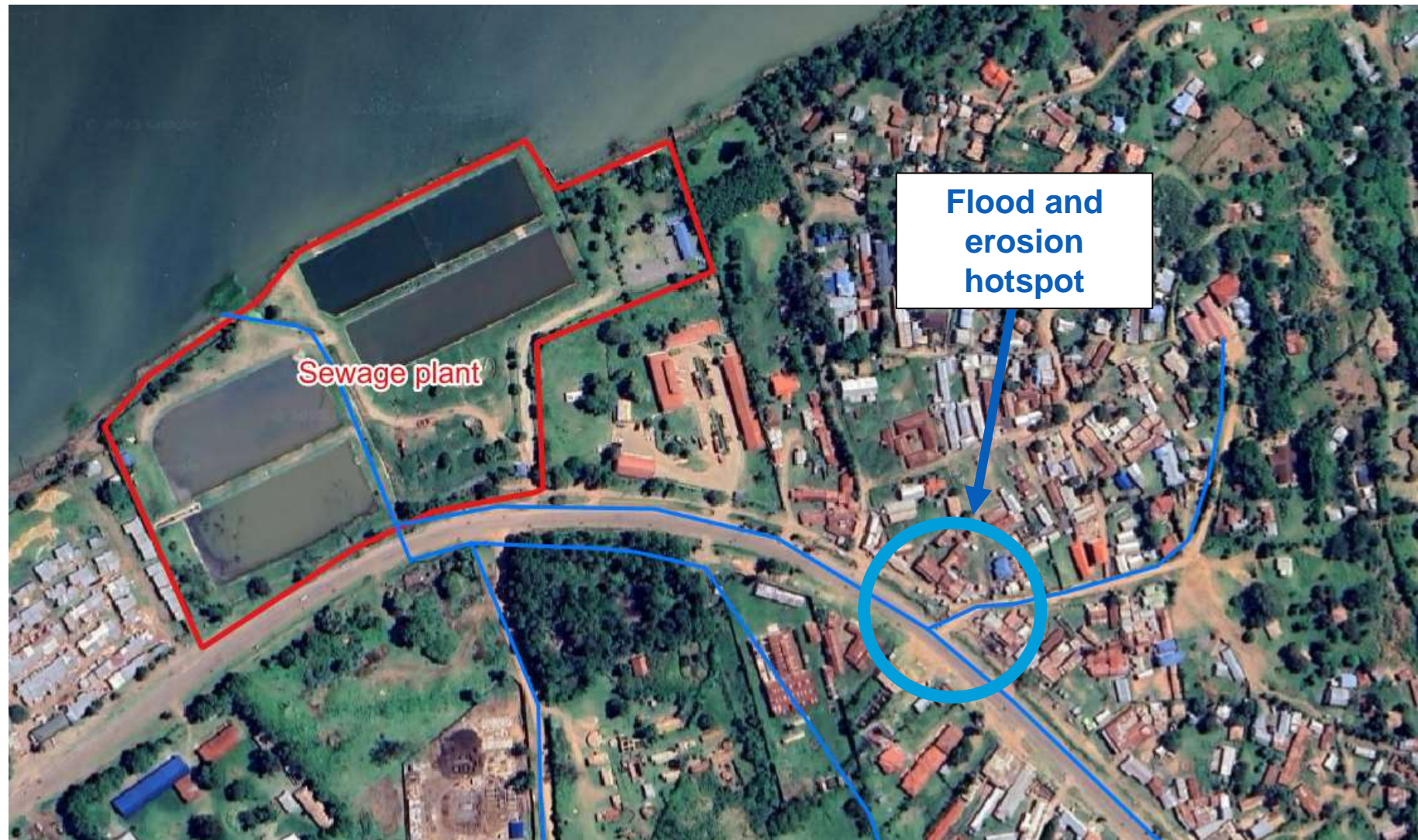


Figure 32: Makongeni exposure map (Source: SUEZ Consulting, 2025)

Case Study: Upgrade of Sewage plant / C19 drainage



Case Study: Upgrade of Sewage plant / C19 drainage

Context and site location

The C19 bend close to Victoria Lake is frequently flooded: sometimes it is blocked for two hours.

This section of C19 brings together the Makongeni primary school and Homa WASCO treatment plant (south-west), housing and shops as well Makongeni Health Centre (east), sewage plant (north-west).

There is a plan of upgrading the roads and surroundings. What would you recommend to make sure climate change impacts are mainstreamed into these investments?



If you were to upgrade this infrastructure, what would you do to ensure the implementation of a climate-resilient upgrade?

- **What need to be checked during the field visit?**
- What are the screening questions needed at each step of the project to ensure resilience?
- What would the be the supporting documentation needed (currently available or that could be easily developed) at each step of the project?
- How would you engage the local community at each step of the project?



Enrich the reality with site visit

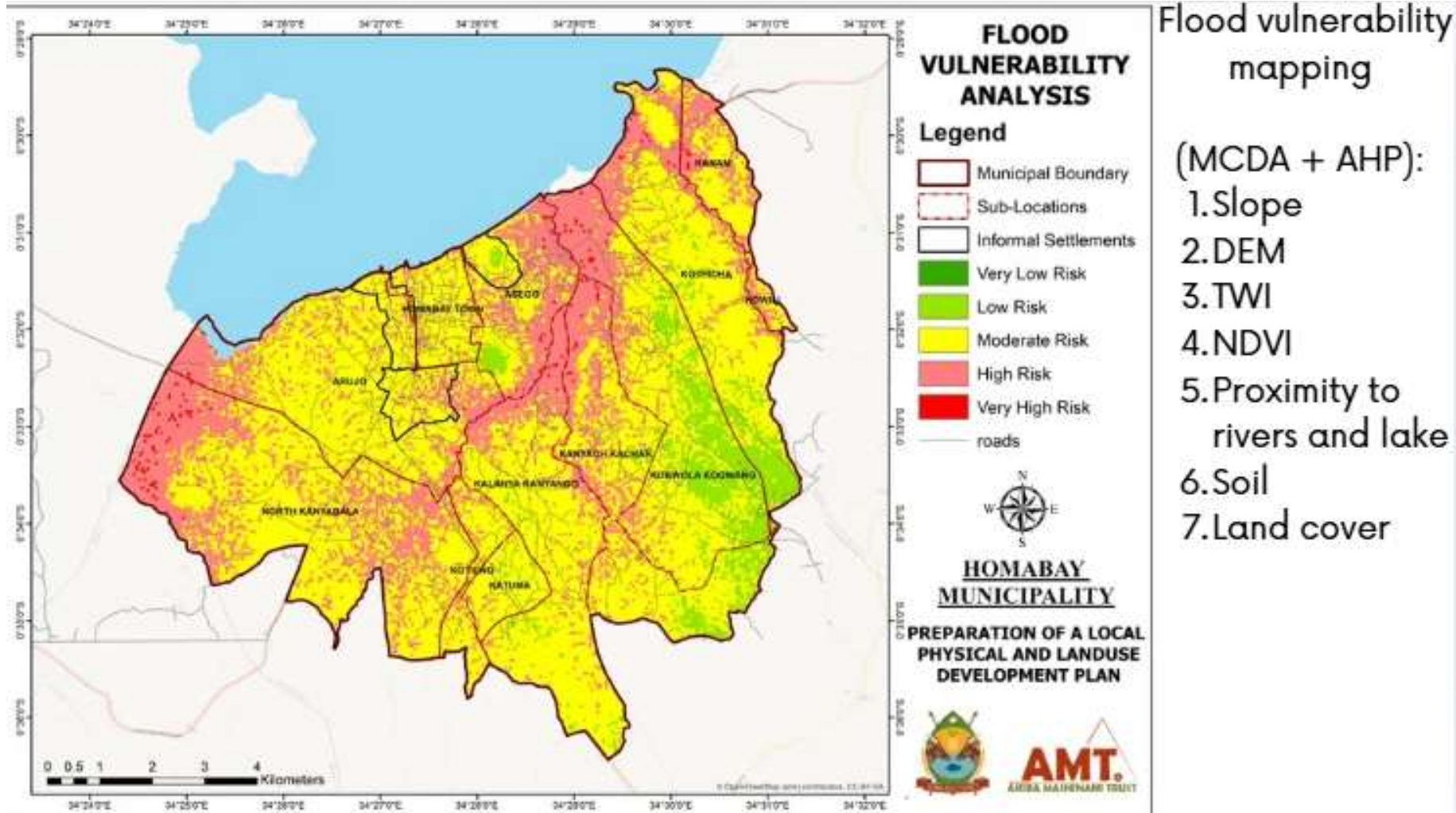


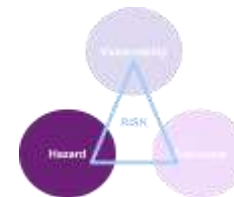
Compare a typical checklist
template to the case study
result

Climate resilient urban investment checklist

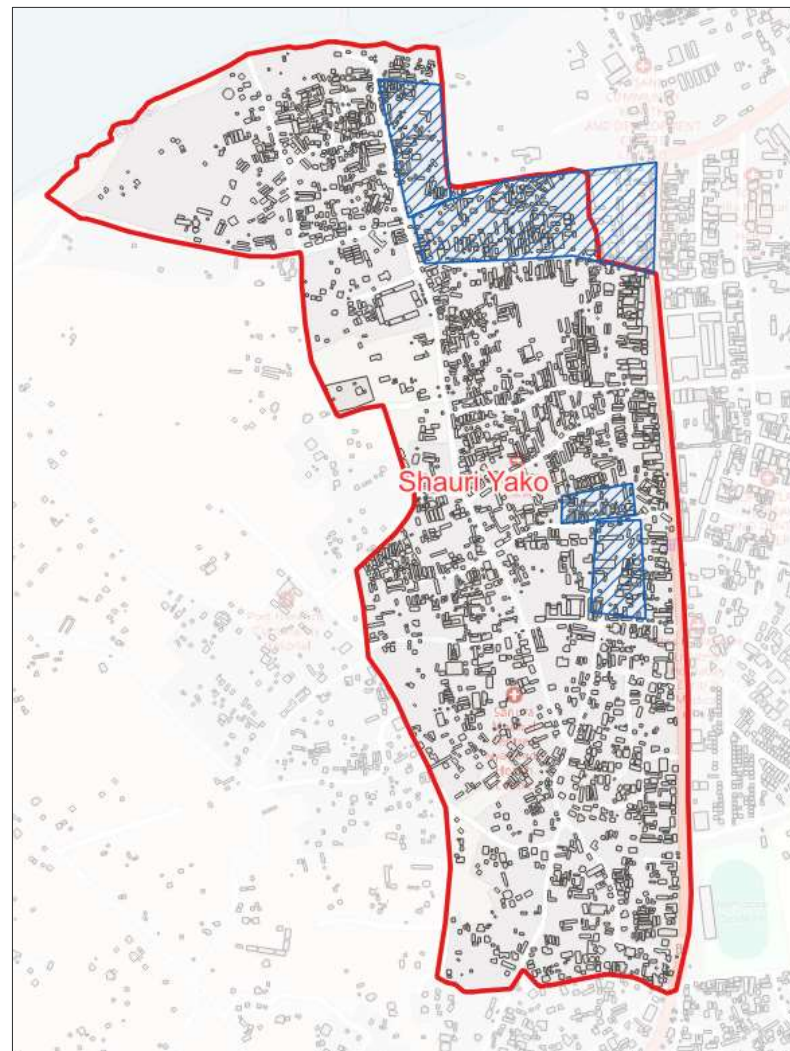
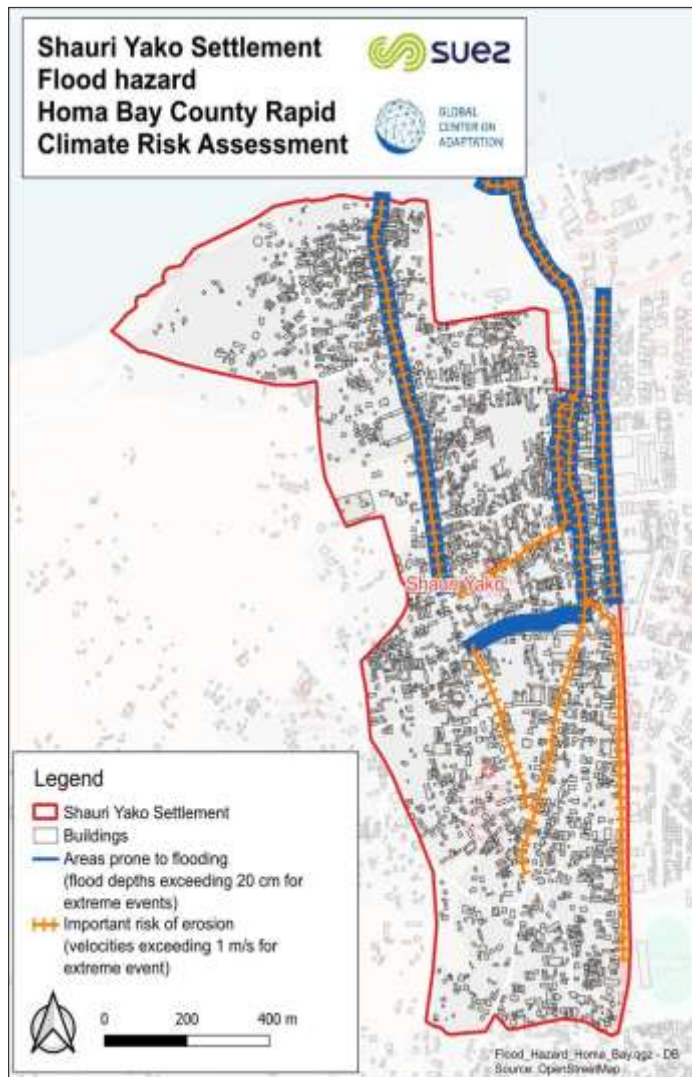
Step	Screening questions	Typical supporting documentation
#1 Diagnosis Planning	<ul style="list-style-type: none">- Have climate hazard and vulnerability assessments been conducted (even basic/local ones)?- Are future climate scenarios considered in site planning or project design?- Is the selected site exposed to risks (floods, erosion)?- Are vulnerable groups (women, elderly, poor) consulted and prioritized?- Have nature-based or low-cost adaptation options been explored?	<ul style="list-style-type: none">- Short local hazard mapping or basic CRA summary (with or without external consultants)- Community sketch maps of hazard zones or traditional knowledge- List of local stakeholders consulted (baraza minutes, school meeting reports)- Reference to national/local DRR plans (even if informal/paper-based)

Diagnosis Planning | Map Risk Area



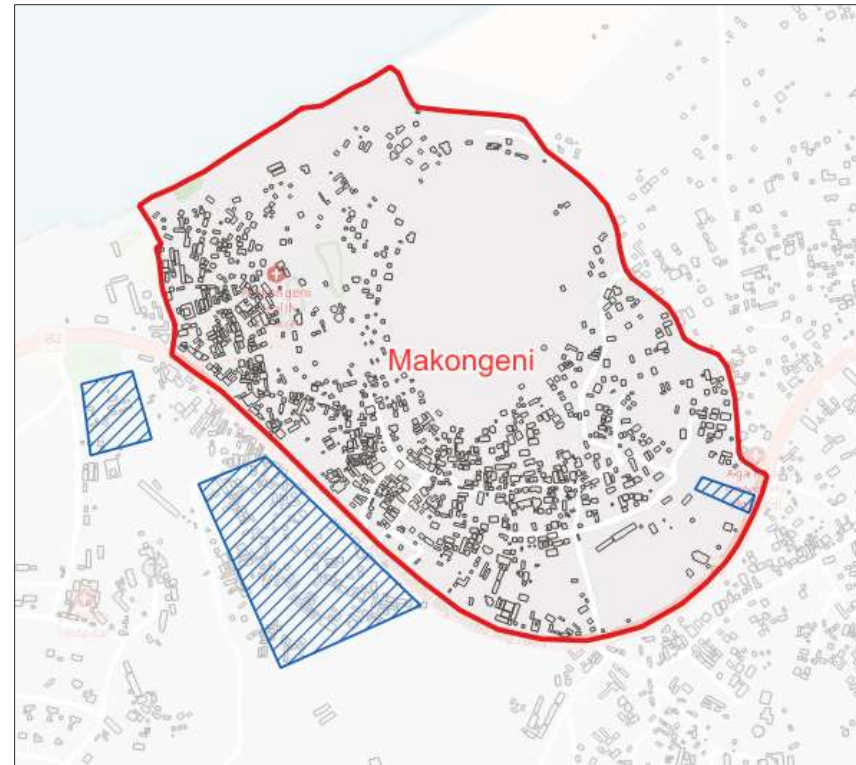
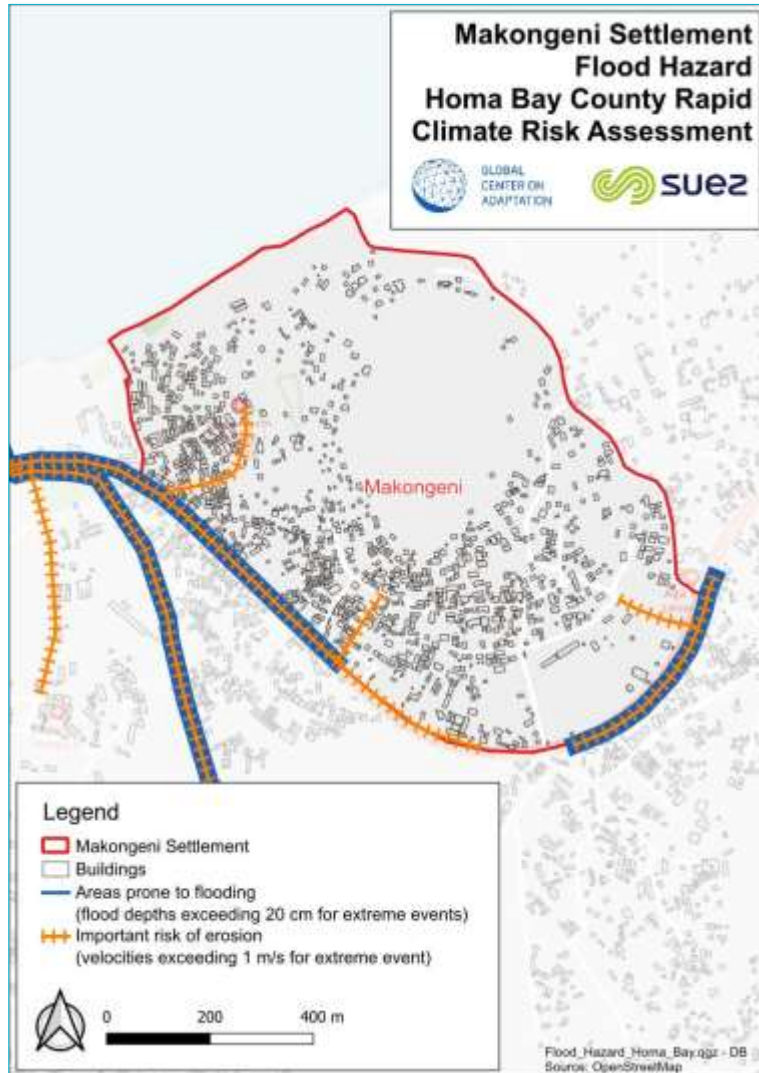


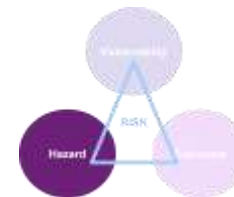
Diagnosis Planning | Map Risk Area



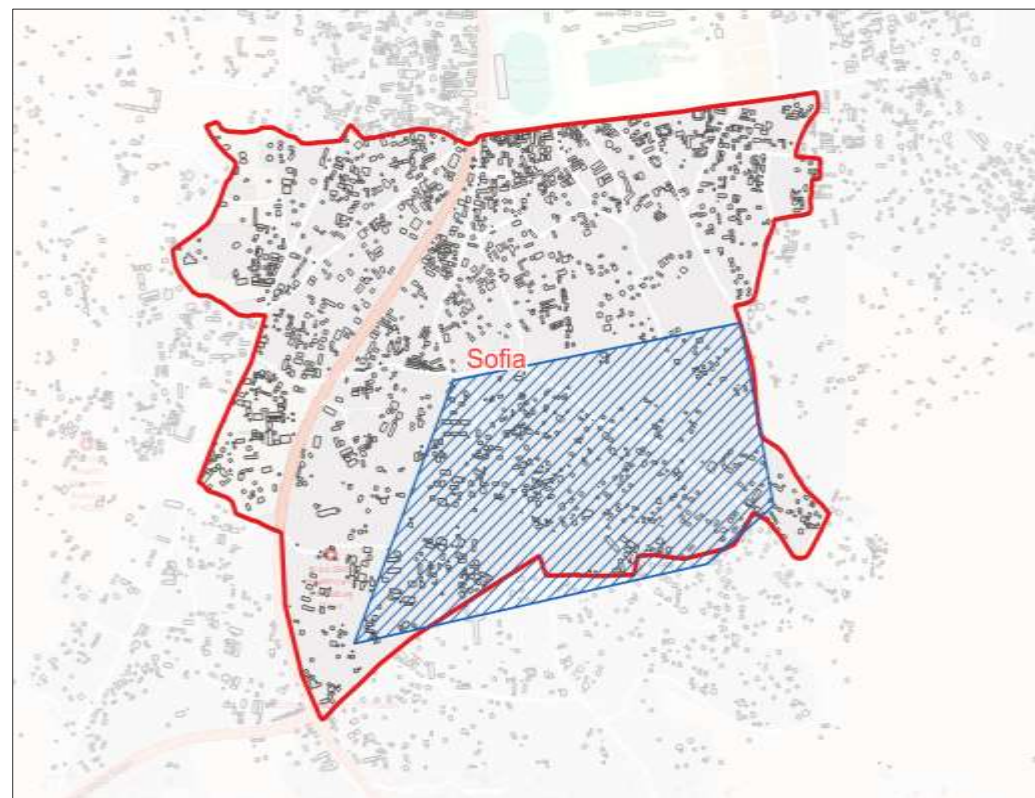
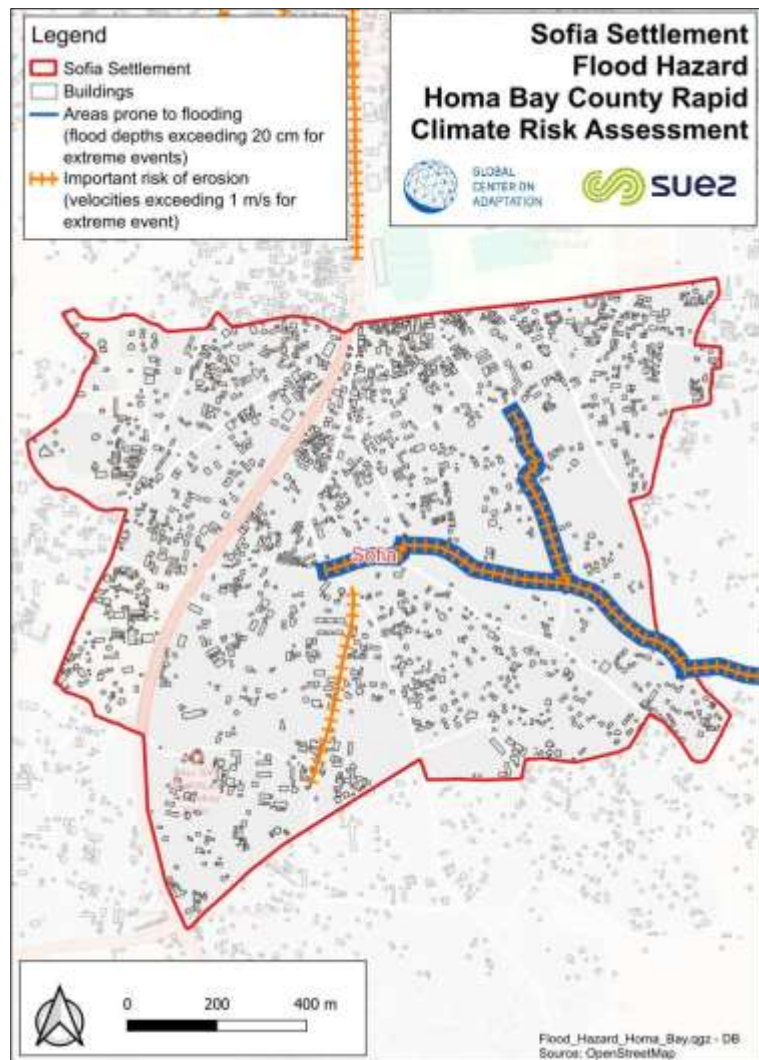


Diagnosis Planning | Map Risk Area





Diagnosis Planning | Map Risk Area



Diagnosis Planning | Community initiatives

Recognize community-level initiatives

Community-led initiatives offer valuable opportunities to integrate local perspectives into resilience development provided they are well identified and institutionalized.

Inspirational example

After the impacts of El Nino rains in February 2024, the Homa Bay government has launched a labor-intensive community work program. The objective of the project is to “transform the informal settlements by addressing the deplorable living conditions through matching population needs with the necessary utilities” as Homa Bay Governor Gladys Wanga said.



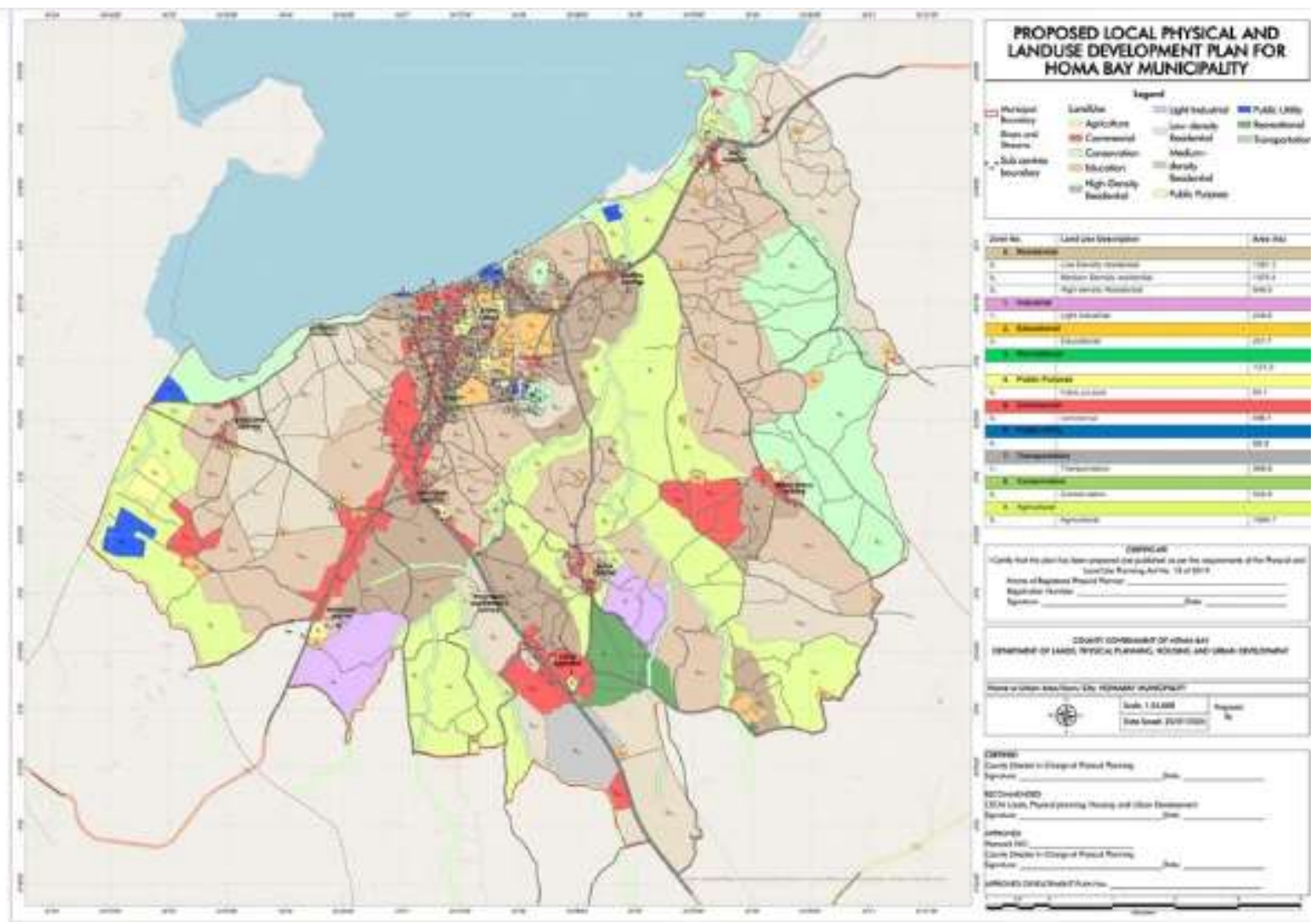
Labor-Intensive Community Work Program in Homa Bay
 (Source: XXX)

Climate resilient urban investment checklist

Step	Screening questions	Typical supporting documentation
#2 Land use & Design	<ul style="list-style-type: none">- Is there any regulatory constraints?- Are resilient features included (e.g., drainage, elevation)?- Are green/blue spaces incorporated (parks, wetlands)?- Are indicators defined to track climate performance over time?- Have communities contributed to identifying needs and risks?- Are equity and social vulnerability (gender, income) reflected?	<ul style="list-style-type: none">- Community-led drawings, diagrams, or design validation workshop reports- Reference to national/international climate-resilient infrastructure options- List of green infrastructure elements with cost estimates- Field notes from inclusive planning sessions or school/youth group input- Climate indicator table (Excel or Word format with 3-4 KPIs)

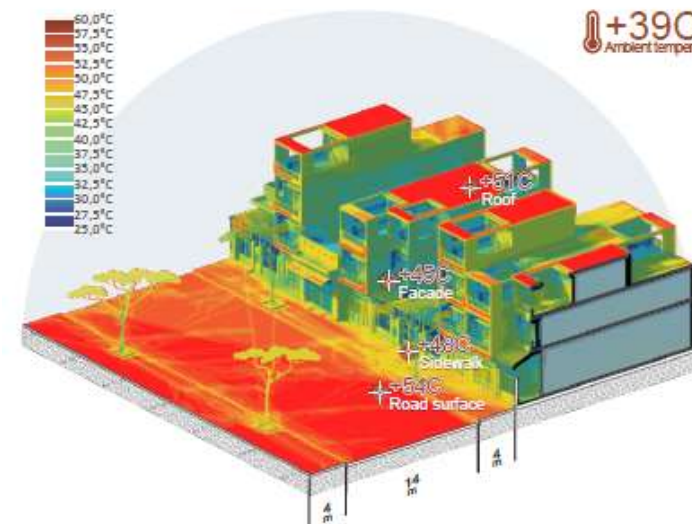
Diagnosis Planning| Environmental quotas

Land use Plan



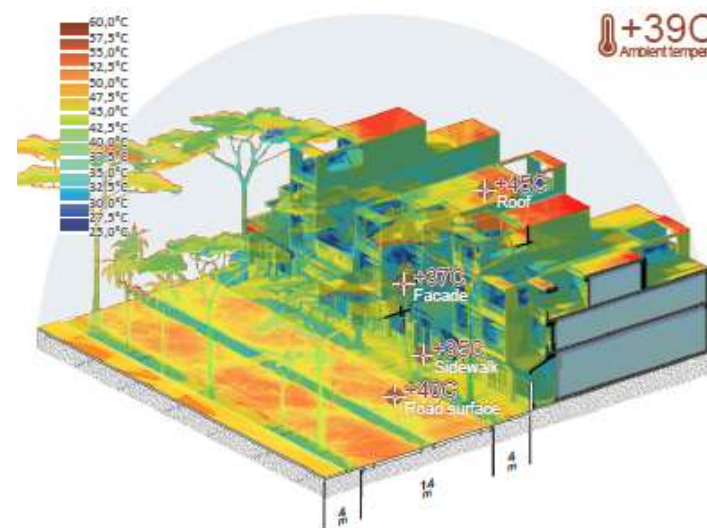
Diagnosis Planning | ESIA

Strengthen the role of Environmental and Social Impact Assessment (ESIA) to drive resilience-oriented investments



URBAN HEAT ISLAND (UHI)

Urban Heat Island could affect a lot the comfort in the city and the daily life of its dwellers. Bystanders on the street can be annoyed by the lack of shadow and the intense heat coming from mineral grounds, cars or AC systems evacuating hot blast on the sidewalk. Even in the private spaces, heat could affect some uses or parts of the indoor areas : rooftop or top levels are the most hot due to the direct and longest sun exposure and the lack of exhausting hot air. In the lower level, space nearby the facade could act as a greenhouse effect if the windows are not protected from sun exposure.



URBAN FRESH ISLAND (UFI)

The adding of high canopy tree and the reducing of the footprint of cars space in order to favor active mobility and planting areas, could bring a significant impact on the whole street space. The bringing of shadow on street space, facades, and even rooftop, protect the spaces from direct sun exposure, and release humidity from evapotranspiration, that could reduce the ambient air.

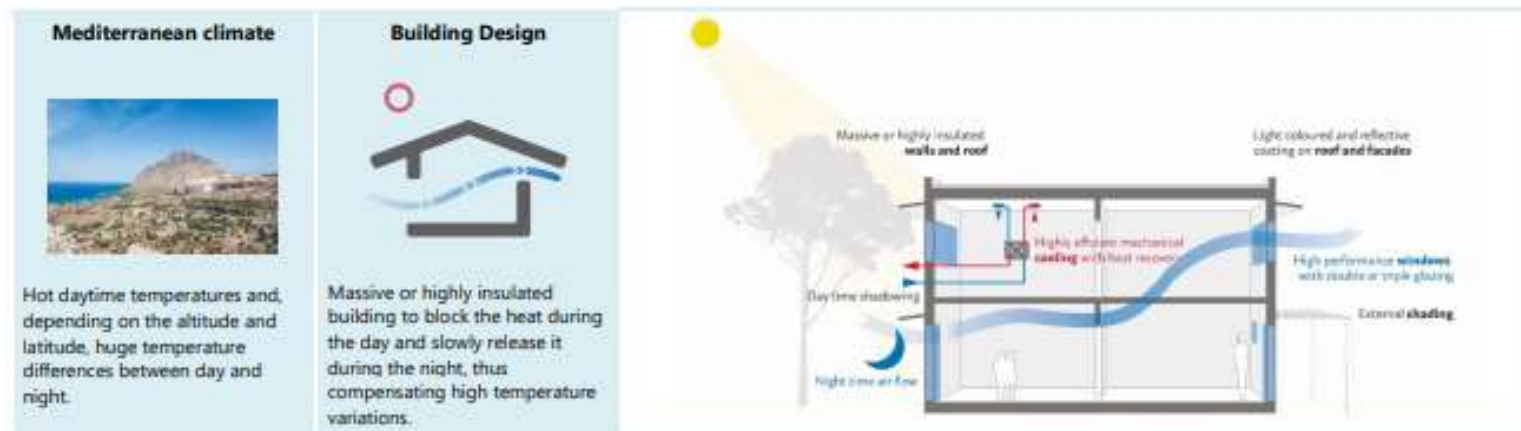
A comparison of two urban development design regarding UHI effect
(source : DE-SO Asia)

Design | Buildings

Define climate resilient development control guidelines for buildings.

At the building level, Prioritize adaptation solutions based on a bioclimatic approach.

MEDITERRANEAN CLIMATE High impact measures for hot climate zones



Building design and high impact measures

Orientation:

- Buildings are oriented from east to west along the sun path, exposing only small façades to the sun.

Shape:

- Buildings are compact and close to each other to expose few façades to the sun and to provide shade.

Openings:

- Openings (doors, windows, vents) face north or south to reduce solar radiation.

Highly efficient building envelope without thermal bridges, superior windows, highly efficient thermal insulation and airtight construction.

Walls

- Thick walls** made of massive construction materials or of composite materials with high thermal insulation.
- Bright and reflective coating** on all exterior façades to reflect high solar radiation.
- Exterior doors with thermal insulation** and airtight seals.

Roofs

- Thick roofs** made of massive or composite materials with high thermal insulation.
- Bright and reflective coating** to reflect solar radiation.
- Roof overhangs** to shade building façades and windows.

Windows

- High performance and airtight windows.**
- Double glazing and low emissivity glass.
- Window frames with **thermal insulation and airtight seals.**
- Exterior shading** on windows blocking solar radiation.

Natural ventilation

- Building envelope (windows, shading) **closed during at day** to block heat.
- Windows **open during the night** to cool building down naturally.

Mechanical cooling

- Mechanical ventilation** can be an additional option only during hot summer months.
- If so, **highly efficient** mechanical cooling system or devices for active cooling.

PEEB Global Programme is a “one-stop shop to accelerate the global shift towards sustainable buildings”
 (source :<https://peeb.build/our-work/>)

Climate resilient urban investment checklist

Step	Screening questions	Typical supporting documentation
#3 Build O&M	<ul style="list-style-type: none">- Are resilience features actually built (photos, contractor reports)?- Are local budgets and responsibilities assigned for O&M?- Is infrastructure designed to operate during shocks (e.g., water backup)?- Is there a local team or individual in charge of monitoring & repairs?	<ul style="list-style-type: none">- Before/after photos of construction stages- Local O&M plan or work routine for caretakers (cleaning drains, inspecting trees)- Maintenance budget summary or local fund allocation notes- Brief skills training session log (e.g., masons trained to maintain eco-toilets)

Diagnosis Planning | Stakeholder engagement

Ensure communication with stakeholders for urban regulations & zoning

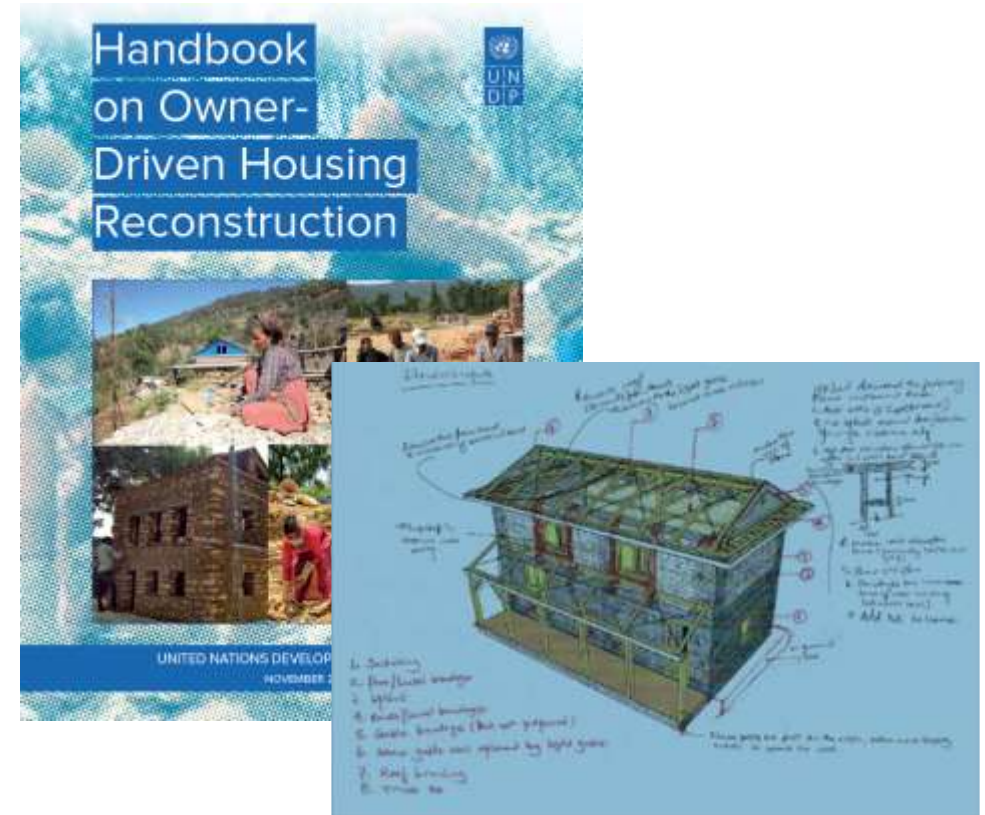
To ensure development control tools are well understood and adopted, it's essential to:

- simplify and translate technical content (plain language, translation, illustrated guides and community handbook),
- engage communities early through participatory processes,
- and use local communication channels by working with local organizations and using digital tools (SMS system, mobile apps to access zoning rules / quick access to building guidelines).

Inspirational example



Developed after the 2015 earthquake, this handbook guides homeowners and local builders through resilient house design, reconstruction, retrofit, and risk reduction best practices. It features plain-language steps, visuals, checklists, and local examples—making technical construction guidance accessible for communities.



UNDP Owner-Driven Housing Reconstruction Handbook
(source :<https://www.undp.org/publications/handbook-owner-driven-housing-reconstruction>)

Construction | Local supply chain

Activate local supply chains for NbS construction and long-term management

Strengthening local supply chains is essential for climate-resilient urban investment, ensuring long-term sustainability, reduced dependency on global markets in face of future disruptions, and alignment with resource constraints intensified by climate change.

Inspirational example



Elementerre, founded in 2010 in Senegal, produces ready-to-use, bio-based construction materials—such as raw earth bricks, typha-based insulating panels, and compressed blocks—to replace energy-intensive concrete and cinder blocks. These materials offer improved thermal comfort and humidity regulation, are fully recyclable, and require minimal energy to manufacture. The project has built over ten ecological structures—including schools and health facilities—in Senegal, trained local laborers, and helped expand an eco-construction market across the region.



Raw earthbrick building

(Sources: <http://www.elementerre-sarl.com/a-propos/>)

Construction, O&M M&E | Community Engagement

Engage & train the community during and after construction

Engaging local communities in the operation and maintenance (O&M) of urban infrastructure is essential to ensuring long-term sustainability and climate resilience.

Inspirational example



In India, Bangladesh, and Nepal, women are taking the lead in climate action within informal settlements. Recognizing their central role in both households and communities, the Mahila Housing Sewa Trust—an NGO based in Ahmedabad, a city severely affected by rising heatwaves—supports women to organize, build skills, and take direct action against climate impacts. The project is centred around an integrated model wherein women take the lead through collective action and technology incubation to devise locally relevant, pro-poor, gender-sensitive and climate-resilient solutions. For example, women were trained to be energy auditors who encourage households to switch to more efficient products, forming a women-led distribution network of green energy and building products. Other solutions include using sprinkler taps to reduce the flow of water, harvesting rainwater, and other behavioural changes leading to more than 60% of households reporting to have increase in water quantity and more than 32% having sufficient water during summers.



Source: <https://www.mahilahousingtrust.org/practice-areas/equitable-access-to-water-and-sanitation/>

Climate resilient urban investment checklist

Step	Screening questions	Typical supporting documentation
#4 M&E	<ul style="list-style-type: none">- Are climate resilience indicators included in M&E (even if simple)?- Can the project evolve based on climate changes?- Do communities participate in monitoring (e.g., scorecards)?- Is data disaggregated (e.g., by gender)?- Is the checklist reviewed based on lessons learned?	<ul style="list-style-type: none">- Short quarterly or yearly progress note (what worked, what didn't)- Citizen scorecard or suggestion log from community meetings- Monitoring sheet (rainwater system use, flood performance, access issues)- Disaggregated tracking template (Excel/Word: by age, gender, location)- Review session notes with local authority or project team

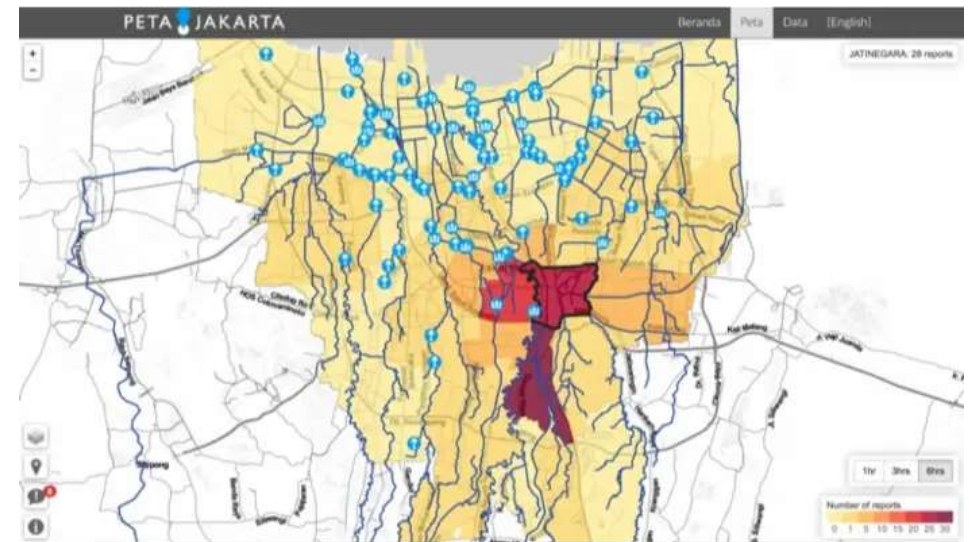
Construction, O&M M&E | M&E data collection

Identify sources of potential data to build the project monitoring framework (inc. local communities engagement), and centralize these data sources.

In data-scarce contexts, effective monitoring and evaluation of climate-resilient urban development requires a flexible, locally grounded approach that leverages partnerships, participatory tools, and innovative technologies.

Inspirational example

In data-scarce environment, the use of social media to tap in citizen sensing data potential is key to monitor evolution of climate change impacts, and potential positive impacts of NbS. The city of Jakarta together with SMART Infrastructure Facility and the University of Wollongong in Australia introduced a crowd-sourced solution, PetaJakarta for collecting sharing of information relating to flood. When someone sees a flood in Jakarta, Tweet #banjir @petajkt (meaning #flood and @MapJKT) will map these flood hotspot on the PetaJakarta.org platform, which then allow citizen to monitor the real-time situation and stay safer. The project, dating back to beginning of 2010, was then the first collaboration between a disaster management agency, a university and Twitter. A more recent example, “Urban Relief” , a Horizon Europe Innovation Action piloted by the University of Dundee, is currently undergoing to monitor a range of environmental issues to support NbS development.



PetaJakarta.org flood hotspot map
 (Source: PetaJakarta.org)

Thank you for your participation!



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